

# QWEST FOUNDATION FOR EDUCATION

## COMPETITIVE SUB-GRANT PROPOSAL ASSURANCE SHEET

Project Title: EMS Science 8 Goes Technological Amount of Request: \$ 5,940.00

Name of Certificated Teacher (or "lead teacher" if more than one): Karen Miller

Name of School currently teaching at: Eagle Middle School

District Name: Joint District District Number: 2

Total number of teachers involved (if more than one): 2

Approximate number of students impacted: 400 Grade level(s) impacted: 8th

Content area(s) impacted: Science

**I certify that if I receive a Qwest Foundation for education Grant -**

- I agree to create a 5-minute video highlighting my project for the purposes of sharing best practices with other Idaho K-12 teachers.
- I agree to do one presentation on my project to other Idaho K-12 teachers before October 31, 2012.
- I agree to submit an electronic report to the Idaho State Department of Education before October 31, 2012.

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SIGNATURE <u>Jerry Reininger</u>		

**Submit one digital copy of your proposal (PDF format) by Thursday, November 10, 2011 (by 5 pm MST) via e-mail to:**

Alex Macdonald  
amacdonald@sde.idaho.gov  
208.332.6955

**Proposals submitted after that date and time will not be considered.**

**\*Only one PDF file per teacher applicant will be accepted (this includes the assurance sheet). Faxes will not be accepted.**

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**Abstract**

At Eagle Middle School, the 8<sup>th</sup> grade science team has a successful physical science curriculum that meets the district and state standards and gives students frequent practice using the scientific method, problem solving and reading science content from a variety of media. Due to a high student-to-computer ratio at our school, much of the technology available to us can only be used for an occasional project or homework assignment or lab demonstration shown on a single computer screen. Our project, "EMS Science 8 Goes Technological", gives us the computer access to make technology a tool students use regularly instead of a gimmick that happens once in a while. With this tool, students will conduct research for independent and interdependent projects and share results from their own experiments while increasing their technological skills and the depth of their understanding of science.

Our students are technological natives but not technological learners. We do not believe all students need their own laptop in science, just as all students do not need their own balance or Bunsen burner. For them to acquire the technological proficiency they will need in their educational years and in their future careers, they need to be using technology as a tool to enhance their learning **on a regular basis**. They need to carry out their own research and create ways to share their data with others. These are the skills our students will need in the 21<sup>st</sup> century world where they will learn and work. Our project puts that tool in the hands of all 8<sup>th</sup> graders at Eagle Middle School for the cost of one laptop per lab or classroom group (12 total).

Our vision is that students will use the laptops during labs to see demonstrations related to their own experiments and share their data with each other. Each lab group will enter data from their experiments on a spreadsheet so we can view class averages in real time (the more data a scientist bases his/her conclusions on, the more accurate those conclusions become). In addition, lab groups will be able to create graphs of their data immediately, enabling students to spend their time analyzing what the data tell them, not tediously drawing and labeling their own graphs.

In addition to lab data, these laptops will be used in the classroom as groups work through a variety of classroom projects. Students will write observations and conclusions after seeing videos of demonstrations that cannot be performed in the classroom. They will read and respond to current science articles from a variety of websites. Group members can view and comment on the articles and science clips they post monthly for homework. Different groups can become experts on different aspects of a topic through internet research and then work in jigsaw groups to share their information with each other.

We believe the strength of our project is that we have a successful science curriculum already in place. Rather than funding a project from the ground up, you are helping us build on an already solid foundation. This technology will move our students toward more student-centered research and learning. Adding this hardware to the 8<sup>th</sup> grade science program allows students to gain valuable technological skills while experiencing a curriculum rich in science concepts, problem solving and reading in the content area. State and district standards emphasize gathering and interpreting data and communicating results, while the Common Core Standards emphasizes literacy in all content areas and using diverse media for reading, writing and communication of ideas. "EMS Science 8 Goes Technological" gives all students at Eagle Middle School the tools to meet those standards and prepare for their lives beyond 8<sup>th</sup> grade.

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**Current Innovation**

The 8<sup>th</sup> grade science team at Eagle Middle School has developed a strong curriculum that combines the physical science content with the more general skills of using the scientific method to answer questions and solve problems, individual research and projects to share information, and scientific reading, writing and data interpretation.

Students in honors science use the scientific process in independent projects in which they develop a question, conduct background research, form a hypothesis, conduct their own experiment and communicate their results to their peers. This type of project has been expanded district-wide to include all 8<sup>th</sup> grade science students and will give them the opportunity to collect data, create computer-generated graphs of their data and present their results to a panel. Science students at Eagle Middle also use the scientific method on shorter-term projects such as determining the "best" paper towel, observing the effects of mass and acceleration on crashing carts, the factors affecting the rate of a reaction, etc.

We also use science mysteries as a way for students to apply the scientific method and solve a problem. For example, instead of just doing a lab on buffers, we give our students the problem of two neighboring Swedish lakes: one dead from acid rain, the other thriving. To solve the problem, they research the causes and effects of acid rain. They experiment to determine the effects of adding acid to a buffer. When they solve the problem of the two Swedish lakes, they have a deeper understanding of buffers, and they have gained skills in using research and data that will transfer to other situations. They also apply the scientific method in their roles as detectives solving The Case of the Missing Snake. We use some common science experiments as ways for our student detectives to test the evidence in the mysterious disappearance of the science department snake. As detectives, students hypothesize who the evil snake-napper is and test their ideas with experiments on each piece of evidence, revising their hypotheses as they build their cases and make their final accusations.

Several projects throughout the year give students the opportunity for individual research and a chance to share their research with their peers. To explore motion and forces, our students select a favorite activity and calculate their own speed, acceleration, force and momentum. They show these calculations and where Newton's laws apply to their activity on a final poster that is shared in small groups. While studying the Periodic Table, each student researches a different element and creates a hands-on, interactive project to share the information with the rest of the class. Each Honors science class also has a wiki page where students post links and comments to current science articles and video clips.

Science students begin each day with an entry in their Scientist Journals. Some days, students read and respond to a current science article from a magazine, newspaper or website. Other entries require students to record their observations and conclusions of science demos done in class or shown on video. Still others give students an experiment or graph to interpret or the opportunity to think and write about concepts from previous lessons. This daily journal gives students the opportunity to practice reading, writing and interpreting information in a nonfiction context which are emphasized both in the Common Core Anchor Standards for Reading, Writing and Speaking and in most work situations they will face as adults.

Although we use technology as often as availability allows, access to a lab group or classroom group computer on a regular basis will enable our students to become more self-directed learners and researchers.

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**Project Narrative**

Our plan is simple: purchase 12 laptops (one per lab group or classroom group) for frequent use during labs and classroom group activities. The goal of "**EMS Science 8 Goes Technological**" is to get students using technology in science on a regular basis. Although our students are technological natives and can text their friends and navigate their Facebook pages while downloading songs to their Ipods and once in awhile getting back to their homework, they are not yet technological learners. With our plan, students will use technology to enhance the science concepts they are learning. They will practice individual and collaborative research as well as increasing the basic technological skills that will transfer to the work environment (using spreadsheets, evaluating the data generated from those spreadsheets, creating graphs of the data, finding information and reading nonfiction from a variety of sources).

Specifically, during labs, groups will post their data to an online excel spreadsheet that will calculate class averages for immediate use in developing conclusions. Groups will also create graphs of their data. Computer generated graphs will allow students to spend more time interpreting their graphs than tediously drawing them by hand. In the "real world" they may never be asked to draw a graph with colored pencils but they may often be asked to create or interpret computer graphs.

In the classroom, groups will use the computer for a variety of purposes. Students will use the internet to research a topic. They will then use their research to create individual projects or to share with other groups in expert jigsaws. For the daily scientist journal, a small group of students can view a demonstration video or science-related photos or video clips and record their observations and conclusions in their notebooks. They will respond to articles on current science websites. After posting links to interesting articles or science video clips as homework, students will share their posts with their groups the next day.

Our plan addresses both the current state technology standards as well as the Common Core State Standards (CCSS) for Reading, Writing and Speaking and Listening including the following:

***State Technology Standard 2: Communication and Collaboration Objectives***

*6-8/CT.2.1.1 Inquire, interact, and communicate ideas, employing a variety of digital media and environments.*

*6-8/CT.2.1.2 Collaborate with others, using digital tools and media to identify and research an issue, compare solutions and make a decision*

***State Technology Standard 3: Research Skills and Critical Thinking Objectives***

*6-8/CT.3.1.3 Demonstrate navigation skills in accessing a variety of information resources and begin using advanced search skills.*

*6-8/CT.3.1.4 Collect, analyze and organize data and information to make decisions, draw conclusions, and create new understanding.*

***CCSS Anchor Standards for Reading***

*#7 Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.*

**CCSS Anchor Standards for Writing**

*#7 Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.*

*#8 Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.*

*#9 Draw evidence from literary or informational texts to support analysis, reflection, and research.*

**CCSS Anchor Standards for Speaking and Listening**

*#2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.*

*#5 Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.*

One of the strengths of our project is that it will reach all 8<sup>th</sup> grade students at Eagle Middle School. Our team includes both of the 8<sup>th</sup> grade science teachers, Melissa Avery and Karen Miller. We have the help and support of our Vice-Principal, Micah Dorumus, who is our school expert on educationally useful websites. Our district IT liaison has already worked with us to test the feasibility of using laptops in the lab. Our well-rounded team includes an expert in hardware, one in software, one in educational technology and one in curriculum.

During the past school year, we borrowed the library laptops for two days and set them up in the lab. Students worked in small groups to research the advantages and disadvantages of different energy sources, using linked websites designed by Melissa Avery. Our IT liaison worked with us to iron out the logistics of passwords and appropriate access for the project, as well as remote internet access. This practice run proved that our project is feasible. We are confident that our lab groups' use of laptops to support their experimental results, to find information and to observe demonstrations of experiments will be as smooth as any project involving technology and hoards of 8<sup>th</sup> graders.

Our school Technology Committee is dedicated to helping teachers obtain hardware, software and training, as well as finding ways to maintain the technology we have at Eagle Middle School. Our IT liaison works tirelessly to keep our hardware up and running. With their help, our project is physically sustainable. Our 8<sup>th</sup> grade team of science teachers meets formally every week and informally as often as possible to improve current curriculum and create new curriculum and will continue to find ways for EMS Science students to "go technological". We have the support of our administration including the participation of one of our vice-principals on our team. Our district technology advisors have been outstanding resources in recommending the best hardware, providing in-service on educational websites and directing us to appropriate funding resources for all of our technology needs.

**EMS Science 8 Goes Technological** puts educational technology in the hands of our students on a regular basis. Students currently use technology to communicate with their friends and access their favorite songs or movies and occasionally for academics (depending on equipment availability at home or at school). Our project makes computers available for students to use often as tools to better understand their own data or a current science topic and to gain skills in finding and sharing information. In the future, our students may not need to know everything we taught them about the Periodic Table or motion, but they will need to interpret data, research, and communicate information. Our plan gives them the equipment required to practice these skills as part of their weekly science classroom experience.

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**Project Scope and Sequence**

The implementation of our “EMS Science Goes Technological” plan is fairly straightforward and includes the following objectives:

**Objective 1: Internet Access**

Our first step after our laptops arrive will be to work with our district IT liaison to get them up and running using our guest passwords and remote internet access. Since we successfully completed a computer-based project in the 8<sup>th</sup> grade science lab last year, our first objective should be achieved with minimal glitches. If we do have any difficulties, we will have the support of both our grant team and our school Technology Committee, as well as the help of our district IT department.

**Objective 2: Get Students on Them!**

Although there may be delays in when our lab laptops will be available for student use, the following list represents a reasonable timeline of student projects.

**1. Rate of Reactions Lab Class Averages (April)**

This lab includes 3 experiments where students compare the effects of three variables on the rate of a reaction. Using on-line excel spreadsheets, each group will enter their data as they complete each experiment. This way they can more accurately base their conclusions on multiple trials instead of just their own group's data (which may or may not be “accurate”).

**2. Current Article and Science Clip postings (April/May)**

Students will post links to current science articles and science video clips and comment on the postings of their peers.

**3. The Mystery of the Two Lakes (May)**

In this inquiry-based curriculum, lab groups will be able to use their laptops to see the two Swedish lakes (one thriving, one dead from acid rain) and conduct their own research into the causes and effects of acid rain. Students will post the information collected from this research, as well as their individual theories on the bulletin board site. After collecting their data on the effect of a buffer on pH, lab groups will again post their results on the class spreadsheet and use the class averages in their conclusions.

**4. Egg Drop Device (June)**

As groups test their egg drop contraptions, we can compare the class averages for acceleration and force in devices that use a parachute with egg drop devices that do not use a parachute.

**5. Scientist Journals (1-2 times per week)**

Groups will use their laptops for the following activities: observe a video of a science demonstration, read a current article from a science website, interpret a graph or experiment, create class lists of physical and chemical properties, etc.

**6. Graphing Data from Individual Science Experiments (PACE) (Sept-Oct)**

Students will create graphs of their data for the district-wide performance assessment (PACE) and use the laptops for creating their final lab reports.

**7. Motion Project (Dec)**

Using Glogster, Powerpoint, etc. each student will present individual research and motion calculations in a favorite activity.

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**Budget Narrative**

To give all 8<sup>th</sup> grade Eagle Middle School students the chance to use technology as a frequent tool to enhance their science learning, we need 12 laptop computers, one per lab team or classroom small group. We can purchase Lenova laptops through our district for \$495 each with no additional charge for shipping, handling or sales tax. Our entire project can be funded for a total of \$5,940.00. Every dollar spent on this project will go directly toward enhancing the technology skills of our students.

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**Budget Spreadsheet**

<b>Activity</b>	<b>Capital Objects</b>	<b>Quantity</b>	<b>Price per Unit</b>	<b>Sub Total</b>
Compiling lab data, generating graphs, finding and viewing articles/images/clips, research, word processing, posting peer comments	Lab group Laptop computers	12	\$495.00	\$5,940.00
			<b>Grand Total</b>	<b>\$5,940.00</b>